

Customer No.: 31561
Application No.: 10/605,276
Docket No.: 10656-US-PA

AMENDMENT

Please amend the application as indicated hereafter.

In the Claims :

1. (canceled) A method of manufacturing a contact, comprising the steps of:
providing a substrate having a first conductive layer and a dielectric layer thereon,
wherein the dielectric layer has a contact opening that exposes a portion of the first
conductive layer;
forming a conductive nano-particle layer on the exposed surface of the first
conductive layer; and
forming a second conductive layer inside the contact opening to cover the
conductive nano-particle layer.
2. (canceled) The method of claim 1, wherein the conductive nano-particle layer
comprises a metallic nano-particle layer.
3. (canceled) The method of claim 1, wherein the conductive nano-particle layer
comprises a silicon nano-particle layer.
4. (canceled) The method of claim 1, wherein the nano-particles inside the
conductive nano-particle layer has an average size smaller than 100 nanometers.
5. (canceled) The method of claim 1, wherein after the step of forming the conductive
nano-particle layer, furthermore comprises performing an annealing process.
6. (canceled) The method of claim 5, wherein the annealing process is performed at a

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temperature between about 50°C to 300°C.

7. (canceled) The method of claim 1, wherein the step of forming the nano-particle layer includes performing a charge adsorption process, comprising the steps of: immersing the substrate with the contact opening already formed thereon in a solution, wherein the solution contains dispersed conductive nano-particles; and passing a direct current into the solution so that the conductive nano-particles are adsorbed and adhered to the surface of the first conductive layer.

8. (canceled) The method of claim 7, wherein the solution furthermore comprises some surfactant.

9. (canceled) The method of claim 1, wherein the step of forming the nano-particle layer includes performing a charge deposition process, comprising the steps of: forming a patterned photoresist layer over the dielectric layer that exposes the contact opening; immersing the substrate structure into an electroplating solution, wherein the electroplating solution contains dispersed conductive nano-particles; and performing an electroplating process using the substrate as an anode and a metallic electrode as a cathode to form the conductive nano-particle layer on the surface of the first conductive layer.

10. (canceled) The method of claim 9, wherein the electroplating solution furthermore comprises some surfactant.

11. (canceled) The method of claim 1, wherein the step of forming the nano-particle

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layer includes performing a molecular self-assembly process, comprising the steps of:

immersing the substrate with a contact opening already formed thereon in a solution having self-assembly molecules so that the self-assembly molecules are adsorbed to the surface of the first conductive layer; and
immersing the substrate in another solution, wherein the solution contains dispersed conductive nano-particles so that the nano-particles are adsorbed towards the layer of self-assembly molecules on the first conductive layer to form the conductive nano-particle layer.

12. (canceled) The method of claim 11, wherein the solution furthermore comprises some surfactant.

13. (original) A semiconductor device structure, comprising:

a conductive layer formed on a substrate;

a dielectric layer formed on the conductive layer;

a contact formed in the dielectric layer, wherein the contact and the conductive layer are electrically connected; and

a conductive nano-particle layer formed between the conductive layer and the contact.

14. (original) The semiconductor device structure of claim 13, wherein the conductive nano-particle layer comprises a metallic nano-particle layer.

15. (original) The semiconductor device structure of claim 13, wherein the

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conductive nano-particle layer comprises a silicon nano-particle layer.

16. (original) The semiconductor device structure of claim 13, wherein conductive nano-particles in the conductive nano-particle layer have an average size smaller than 100 nanometers.

17. (original) The semiconductor device structure of claim 13, wherein the conductive nano-particle layer comprises a nano-particle consolidated nano-particle film.

18. (original) The semiconductor device structure of claim 13, wherein material forming the conductive layer comprises aluminum.